IN THE CLAIMS:

Amendments to existing claims:

3. (Amended) An extruder according to claim 1 [or claim 2], characterised in that for each nip there is more than one recess (13), spaced axially along the gearwheel (2, 3, 20, 30).

5. (Amended) An extruder according to claim 3 [or claim 4], characterised in that the width of the recesses (13) in total is less than half the width of the gearwheel (2, 3, 20, 30).

6. (Amended) An extruder according to claim 1 [any preceding claim], characterised in that the cross-sections of the or each recess (13) are arranged to that the total maximum cross-section exceeds the volume of material that can fill the gear teeth.

7. (Amended) An extruder according to claim 1 [any preceding claim], characterised in that the cross-sections of the or each recess (13) are arranged to that the total maximum cross-section exceeds the volume of material that can fill the gear teeth.

8. (Amended) An extruder according to claim 1 [any preceding claim], characterised in that the feed inlet (24) feeds a single intake nip formed between the gear wheel (20, 30) and the casing wall, and the non-fed gearwheel (21, 31) allows entrained air to escape from a region of pressure buildup on the outlet side of the gear pump where the gearwheels (20, 21; 30, 31) mesh.

10. (Amended) An extruder according to claim 8 [or claim 9], characterised in that an escape passage for gas or air is provided at a position on the circumference of the non-fed gearwheel (21, 31) between the pressure buildup region and the feed inlet (24).

11. (Amended) An extruder according to claim 8 [or claim 9], characterised in that, at the pressure buildup region an edge of the outlet (25) defined by the casing part surrounding the non-fed gearwheel (21, 31) is provided with a projection extending towards or beyond a common tangent to the pitch circles of the gearwheels (20, 21; 30, 31).

15. (Amended) An extruder according to claim 13 [or claim 14], characterised in that the escape passage (78. 79) leads to the feed inlet (64) or to a separate escape outlet (85) formed in the casing.

17. (Amended) An extruder according to claim 13 [any of claims 13 or 16], characterised in that the gearwheels (60, 61; 80, 81; 90, 91) are of unequal diameters, and the feed inlet (64, 84) leads to the nip of the larger gearwheel (60; 80; 90).

18. (Amended) An extruder according to claim 13 [any preceding claim]. characterised in that one gearwheel (21) is co-axial with a screw extruder of the Transfermix type, fed from the outlet (25) of the gear pump.

19. (Amended) An extruder according to claim 13 [any of claims 1 to 17], characterised in that the gear pump has an outlet (33) at right angles to the axes of the gearwheels (30, 31), and the outlet (33) leads to a Transfermix extruder (38).

20. (Amended) An extruder according to claim 18 [or claim 19], characterised in that the Transfermix extruder comprises a stator component (41) with helical threads co-operating with a second component (42) with oppositely-handed helical threads.

23. (Amended) An extruder according to claim 13 [any preceding claim], characterised in that each gearwheel is separately driven from shafts of a gearbox.

24. (Amended) An extruder according to claim 13 [any preceding claim] characterised in that the gearwheels are cut in skew or arrow-fashion, so that the material is moved away from one or both end-plates of the gear pump.

PATENT
Attorney Docket No. 214966

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Paul Meyer

Application No.

Filed:

For: GEAR PUMP EXTRUDERS

Art Unit: Unassigned

Examiner: Unassigned

PENDING CLAIMS AFTER ENTRY OF PRELIMINARY AMENDMENT

1. An extruder for polymers and/or elastomeric materials includes a gear pump having a casing in which a pair of toothed gearwheels rotate, at least one feed inlet for feeding the material into at least one intake nip between a gearwheel and a wall of the casing, and an outlet for the material, characterised in that at least one recess (13) is provided in the casing wall (1) at least one intake nip, the or each recess (13) extending in the direction of rotation of the gearwheel (2, 3, 20, 30) and commencing at zero cross-section prior to the nip, increasing up to the nip to a full cross-section and then having a cross-section reducing to zero within the closed transport circumference of the gearwheel (2, 3, 20, 30) the arrangement being such that a feed strip or sheet has a continuous length of a part of its width moved through the or each recess (13) beyond the nip into a position where another part of the feed strip or sheet is entrained within the gearwheel (2, 3, 20, 30) and is there gradually squeezed into the gearwheel whereby a cutting off of the feed strip or sheet at the nip is positively prevented.

2. An extruder according to claim 1, characterised in that the depth of the gear teeth at the or each nip corresponds to the thickness of standard feed strip or sheet or the leading dimension of standard pellets.

3. An extruder according to claim 1 [or claim 2], characterised in that for each nip there is more than one recess (13, spaced axially along the gearwheel (2, 3, 20, 30).

4. An extruder according to claim 3, characterised in that the recesses (13) are spaced along the whole axial width of the gearwheel (2, 3, 20,30).

5. An extruder according to claim 3, characterised in that the width of the recesses (13) in total is less than half the width of the gearwheel (2, 3, 20, 30).

6. An extruder according to claim 1, characterised in that the cross-sections of the or each recess (13) are arranged to that the total maximum cross-section exceeds the volume of material that can fill the gear teeth.

7. An extruder according to claim 1, characterised in that the cross-sections of the or each recess (13) are arranged to that the total maximum cross-section exceeds the volume of material that can fill the gear teeth.

8. An extruder according to claim 1, characterised in that the feed inlet (24) feeds a single intake nip formed between the gear wheel (20, 30) and the casing wall, and the non-fed gearwheel (21, 31) allows entrained air to escape from a region of pressure buildup on the outlet side of the gear pump where the gearwheels (20, 21; 30, 31) mesh.

9. An extruder according to claim 8, characterised in that the gearwheels (20, 12; 30, 31) are of unequal diameters and the feed inlet (24) leads to the nip of the larger gearwheel (20, 30).

10. An extruder according to claim 8, characterised in that an escape passage for gas or air is provided at a position on the circumference of the non-fed gearwheel (21, 31) between the pressure buildup region and the feed inlet (24).

11. An extruder according to claim 8, characterised in that, at the pressure buildup region an edge of the outlet (25) defined by the casing part surrounding the non-fed gearwheel (21, 31) is provided with a projection extending towards or beyond a common tangent to the pitch circles of the gearwheels (20, 21; 30, 31).

12. An extruder according to claim 11, characterised in that the projection is provided with a by-pass leading from the outlet (25) to a gear tooth space in the non-fed gearwheel (21, 31).

13. An extruder for polymers and/or elastomeric materials includes a gear pump having a casing in which a pair of toothed gearwheels rotate, at least one feed inlet for feeding the material into at least one intake nip between a gearwheel and a wall of the casing, and an outlet for the material, characterised in that the feed inlet (64, 84) leads to a single intake nip formed between one gearwheel (60, 80) and the casing wall (62, 82), and a region where the gearwheels (60, 61; 80, 81) mesh adjacent the outlet (65) provides a region of pressure buildup of the material, with the escape of gas being through the non-fed gearwheel at the pressure buildup region.

14. An extruder according to claim 13, characterised in that the casing has an escape passage (78, 79) for the escape of gas provided at a position on the circumference of the non-fed gearwheel (61, 81) between the pressure buildup region and the feed inlet (64, 84).

15. An extruder according to claim 13, characterised in that the escape passage (78. 79) leads to the feed inlet (64) or to a separate escape outlet (85) formed in the casing.

16. An extruder according to claim 13, characterised in that the escape passage comprises a by-pass (101) formed in a casing projection (100) at the outlet, and leading from the outlet to a gear tooth space in the non-fed gearwheel (91).

17. An extruder according to claim 13, characterised in that the gearwheels (60, 61; 80, 81; 90, 91) are of unequal diameters, and the feed inlet (64, 84) leads to the nip of the larger gearwheel (60; 80; 90).

18. An extruder according to claim 13. characterised in that one gearwheel (21) is co-axial with a screw extruder of the Transfermix type, fed from the outlet (25) of the gear pump.

19. An extruder according to claim 13, characterised in that the gear pump has an outlet (33) at right angles to the axes of the gearwheels (30, 31), and the outlet (33) leads to a Transfermix extruder (38).

20. An extruder according to claim 18, characterised in that the Transfermix extruder comprises a stator component (41) with helical threads co-operating with a second component (42) with oppositely-handed helical threads.

21. An extruder according to claim 20, characterised in that the second component (42) is stationary.

22. An extruder according to claim 20, characterised in that the second component (42) is driven by the material fed from the gear pump.

23. An extruder according to claim 13, characterised in that each gearwheel is separately driven from shafts of a gearbox.

24. An extruder according to claim 13 characterised in that the gearwheels are cut in skew or arrow-fashion, so that the material is moved away from one or both end-plates of the gear pump.

25. An extruder according to claim 24, in which an escape passage for gas or air is provided in one or both end-plates of the gear pump.